Replacement Drawings

The attached sheet(s) of drawings which includes Fig(s) 1-8, replaces the original sheet(s) including Fig(s) 1-8.

Attachment: Replacement Sheet(s)

REMARKS

This is in response to the Office Action of October 23, 2007, in which claims 1-46 and claim 57 were rejected. Claims 47-56 had been previously withdrawn. Claims 1, 18, and 37 have been amended herein and new claims 58 and 59, dependent on claims 13 and 37, respectively, are newly presented. No new matter has been added by the amendments or the new claims, which are supported by the disclosure in ¶¶ 0080-0082. In addition, claim 13 has been amended to correct a typographical error by changing the second recitation of "fifth control input" to the corrected "sixth control input." The dependency of claim 20 has been changed from 18 to 19 to clarify antecedent basis.

Replacement drawings responsive to the communication in paragraph 2 of the Office Action are submitted with this response.

Rejections under 35 U.S.C. § 102

Office Action paragraph 3. Claim 57 has been rejected as allegedly anticipated by Yamashita (JP-01-214519). As part of the rejection, the Examiner asserts that tank 2 of Yamashita meets the claimed "means for" receiving/injecting the particulate substances. Applicant disagrees.

Since applicant's claim contains means-plus-function language, the cited tank 2 of Yamashita can meet this element only if it satisfies the same function through structure that is the same as or equivalent to the corresponding structure for the claimed means in applicant's specification. It does not.

Applicant's structure is disclosed in ¶¶ 0079-0082 of the specification, which discloses that the claimed transfer pot 51 is connected to a source of pressurized air and has two valves associated with it, one (valve 48) that allows selective communication with the air source, and another (valve 55) that allows selective communication with the downstream fluid stream (here, piping in communication with the regenerator of the fluid catalytic cracking unit). As disclosed in these paragraphs of the specification, applicant's "means" "injects" the particulate material: It pressurizes the pot, then shuts the valve to the air source, and only then opens the valve to the fluid stream; as stated, the particulates in the pot are transferred to the fluid stream by the differential in pressure between the higher pressure in the pot and the lower pressure downstream in the FCC unit. Such injection is distinct from

carrying the particulates in a continuous stream of air that enters the pot, sweeps up the particles and entrains them as it exits the pot though a downstream port. Since in applicant's "means," the transfer pot is no longer in communication with the air source when the outlet valve (allowing flow to the downstream unit) is opened, there is no entrainment of the particulates in a continuous stream of air. Such entrainment, however, is the principle by which tank 2 of Yamashita works.

More particularly, in Yamashita, according to the translation of the reference provided in the office action, bulk particulate material falls from a storage hopper into the pot 2, and a pneumatic pump 3 is thereafter activated. The pump draws a vacuum in the hopper, which draws more material into the hopper from a reservoir, and the "discharge gas" from this same pump is lead "into the pressure tank 2 [to] carry the bulk material from the pressure tank 2 through a carrying pipe 6" to an undisclosed downstream operation. Despite referring to tank 2 as "pressurized," however, Yamashita nowhere teaches that the tank is in fact pressurized by air *before* any communication between the tank and stream 6 is permitted, and Yamashita does not suggest that the discharge air from the pump is halted while the bulk material is being swept out of "pressure" tank 2. In fact, the reference teaches the opposite – the pump is kept running so that, in a single operation, as the pump's discharge entrains bulk material and carries it from tank 2 into and through pipe 6, the pump is simultaneously drawing a vacuum in the hopper so that more material can be loaded from the reservoir.

Thus, Yamashita's system only entrains the particulates from tank 2 in a continuing flowing stream. It does not have the same "injection" function as the "means" of claim 57 (the pot and its associated valves), which truly "injects" the material in response to the pressure differential between a pre-pressurized pot and the lower downstream pressure of the target stream. Because of these differences between the injection function and specification-disclosed structures of the "means" of claim 57 on the one hand, and the entrainment function of the tank and pneumatic pump of Yamashita on the other hand, the Yamashita disclosures do not satisfy the "means" recited in claim 57. Yamashita discloses nothing that has both the same injection function as the recited "means" as well as structure that is the same as or equivalent to what is shown in applicant's specification. For this reason, the anticipation rejection should be withdrawn.

Office Action paragraph 4. Claims 1-4, 9, 11, 15-21, 26, 27, 31, 46, and 57 are rejected as anticipated by the Markham reference. Claims 1, 18, 46, and 57 are independent claims. Each of these claims, and therefore the rejected dependent claims, recite structure (or "means") that are not disclosed in Markham, and therefore the anticipation rejection should be withdrawn.

Each of the claims at issue is distinguishable from Markham on the basis of the structure by which particulate catalyst/additive is transferred or injected from the loading unit. Specifically, claims 1 and 18 each recite that the transfer pot (claim 1) or loading unit (claim 18) is capable of being pressurized so that the catalyst/additive particles are transferred to the FCC unit "in response to a pressure differential between the [transfer pot/loading unit] and the fluid catalytic cracking unit."[1] Similarly, claim 46 recites the same "means for receiving/injecting" element as claim 57, which, as described extensively above, is a pressurized vessel from which the catalyst/additive material is "injected" in response to a pressure differential between the vessel and the downstream operation.

Markham discloses no such structure. In Markham, the vessel that the Examiner analogizes to applicant's transfer pot or loading unit is Markham's hopper 8. Markham does not teach or even suggest that this hopper is pressurized. Nor is there any teaching or suggestion that the particulates are transferred from this hopper in response to a pressure differential between the hopper and the downstream fluidized bed column.

To the contrary, particles are metered from the hopper by gravity, through rotary star valve 11, into an ejector unit 12 through which is flowing a stream of pressurized air that entrains the particles and carries them downstream to the column. Although the stream of air is at higher pressure than column 25, hopper 8 itself is isolated from the higher pressure by star valve 11. Thus hopper 8 is not pressurized and the apparatus of Markham does not transfer or inject particles from hopper 8 into the column in response to a pressure differential between hopper 8 and the column. Thus, Markham does not teach the pressurized transfer pot of claims 1 or 18 or the injection "means" of claims 46 or 57. For this reason, Markham cannot anticipate the claims and the rejection should be withdrawn.

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[1] Claim 18 refers to a loading unit. Dependent claim 19 further specifies that the loading unit has a dust collecting unit and a transfer pot, as in claim 1.

Rejections under 35 U.S.C. § 103

Office Action paragraph 5. Claims 5 and 28 have been rejected as obvious from Markham in view of Harpham. Claim 5, dependent on claim 1, recites a moisture trap for the source of pressurized air, which is said to be disclosed by Harpham, and claim 28, dependent on claim 18, recites a minimum distance between the loading unit and the storage bin, which is said to be an obvious design choice in view of the spaced apart relationship shown in Harpham. These rejections are traversed, however, for the reasons provided in response to Action paragraph 4 above.

Claims 5 and 28 are each dependent on independent claims (1 and 18, respectively) that, as addressed in the response above, are fully distinguished from the underlying Markham reference. Even if the teaching of Harpham were properly combinable with those of Markham, the inventions of claims 5 and 28 would still not be obtained or suggested, since the underlying Markham reference does not teach or suggest the recited elements of the underlying independent claims. And nothing in Harpham bridges this difference, since Harpham, like Markham, does not teach a system for the transfer or injection of particles from a pressurized chamber to a downstream operation based on the pressure differential between the chamber and the downstream operation. Accordingly, this rejection should be withdrawn.

Office Action paragraph 6. Claims 6 and 7 and claims 22 and 23 have been rejected as obvious from Markham in view of Russell. Claim 6 (dependent from claim 1) recites the presence of load cells for measuring the combined weight of the dust collector and transfer pot, together with catalyst/additive particles drawn into the collector, and claim 7 (dependent from 6), further recites the presence of a cabinet for housing the pot and collector and the arrangement of those structures with the load cells. Claim 22 (dependent from claim 18) is analogous to claim 6 in that it recites the presence of load cells for measuring the combined weight of the loading unit and catalyst/additive particles drawn into it, and claim 23 adds limitations to claim 22 analogous to those added by claim 7 to claim 6.

In the rejection, the Examiner states that the presence of load cells is taught by Russel and that the claims are therefore obvious by modifying Markham to include load cells such as in Russel, and that claims 7 and 23 are obvious on the basis that providing a cabinet for the transfer systems and arranging the load cells would have been obvious design variants. These

rejections are traversed, however, for the reasons provided in response to Action paragraphs 4 and 5 above.

As discussed in those sections above, the underlying independent claims 1 and 18 are fully distinguished from the underlying Markham reference. Even if the teachings of Russell were properly combinable with those of Markham, the inventions of claims 6, 7, 22, and 23 would still not be obtained or suggested, since the underlying Markham reference does not teach or suggest the recited elements of the underlying independent claims. Nor does anything in Russell overcome this difference since Russell, like Markham, does not teach a system for the transfer or injection of particles from a pressurized chamber to a downstream operation where the transfer or injection is as a result of the pressure differential between the chamber and the downstream operation. Accordingly, this rejection should be withdrawn.

The rejection should be withdrawn for the additional reason that the combination of Russell with Markham is not proper in the first instance. Markham has no need for weigh cells for hopper 8 since Markham involves a method for *making* catalyst (not transferring or injecting catalyst or additive in discrete amounts into an operation), and, more importantly, the system of Markham supplies the particles from hopper 8 in a *continuous* manner to the column. ("From the hopper 8 the mixture passes under the control of a *continuously* driven, rotary star valve 11 into the ejector 12," which introduces the particles into a stream of compressed air, which carries them to the column. See col. 2, lines 68, through column 3, line 4, emphasis added). Since hopper 8 of Markham is, in essence, a dynamic holding tank, there is no suggested need for determining the weight of its contents, and therefore is no reason to add the load cells of Russell to the Markham system.

Office Action paragraph 7. Claims 6, 12, 13, and 22 have been rejected as obvious from Markham in view of Fukushima. Claim 6 (dependent from claim 1) recites the presence of load cells for measuring the combined weight of the dust collector and transfer pot, together with catalyst/additive particles drawn into the collector, and claim 12 (dependent on claim 1) and claim 13 (dependent on 12) further recite particular valving for the transfer of the catalyst/additive from the transfer pot to the FCC unit. Claim 22 (dependent from independent claim 18) is analogous to claim 6 in that it recites the load cells for measuring the combined weight of the loading unit and catalyst/additive particles drawn into it.

The Examiner states that the presence of load cells and of controllable valves is taught by Fukushima. These rejections are traversed, however, for similar reasons as provided above with respect to the rejections under Office Action paragraphs 4 and 6. As discussed, the underlying independent claims 1 and 18 are distinguishable from the underlying Markham reference, such that even if the teachings of Fukushima were properly combinable with those of Markham, the inventions of claims 6, 12, 13, and 22 would still not be obtained or suggested, since neither the underlying Markham reference nor the Fukushima reference teaches or suggests the specific means of transfer of particles to the downstream operation. More particularly, Markham, does not teach a system for the transfer or injection of particles from a pressurized chamber to a downstream operation where the transfer or injection is as a result of the pressure differential between the chamber and the downstream operation. Nothing in Fukushima cures this deficiency as there is no teaching discernible from the reference translation that Fukushima's tank 2 is pressurized before valves 9 and 11 are opened, and therefore no teaching that the material in tank 2 is injected into the downstream operation as the result of such a pressure differential.[2]

Moreover, and also as discussed above in the response to paragraph 6, Markham has no need for load cells at all, so the modification of Markham with Fukushima, ostensibly to provide the load cells as now claimed, is not a proper use of the references in the first instance. Thus, claims 6 and 22 are patentable for this additional reason.

Office Action paragraph 8. Claims 10 and 25 have been rejected as obvious from Markham in view of Pendelton. Claim 10 is ultimately dependent on claim 1 and claim 25 is ultimately dependent on claim 18. This rejection should be withdrawn for the same reasons provided in response to the previous rejections in paragraphs 4, 5, and 6, which were also based on the Markham reference. The base independent claims are distinguished from the underlying Markham reference in that Markham does not teach or suggest the recited elements of those claims pertaining to the system structure for transferring or injecting

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[2] The deficiencies in the teachings of Markham and Fukishima are particularly apparent with respect to claims 12 and 13, which teach a controllable valve system that is designed to operate so that the transfer pot is not opened to the FCC unit, via the third valve, until the pot is fully pressurized and second valve is closed, a design which, in turn, causes the transfer or injection of material from thee transfer pot to the FCC unit as a result of the pressure differential between them.

material; Pendelton does not cure that deficiency since Pendelton, like Markham, does not teach a system for the transfer or injection of particles from a *pressurized* chamber to a downstream operation based on the pressure differential between the chamber and the downstream operation. Accordingly, this rejection should be withdrawn.

Office Action paragraph 9. Claim 14 (dependent on claim 1), claims 29 and 30 (dependent on claim 18), claim 32, and claims 33-36, 38, 39, and 42-45 (dependent on claim 32) have been rejected as obvious from Markham in view of Brandauer. The Examiner cites Brandauer for its additional disclosure of drawing particulates into the particle handling system from different reservoir bins. These rejections should be withdrawn.

The rejection to claims dependent on claim 1 or claim 18 (claims 14, 29, and 30) are overcome for the same reasons given in response to paragraphs 4, 5, and 6 above, also based primarily on the Markham reference: The base independent claims are distinguished from Markham in that this reference does not teach or suggest the recited elements of the those claims pertaining to the system structure for transferring or injecting material, and Brandauer does not cure that deficiency since Brandauer, like Markham, does not teach a system for the transfer or injection of particles from a *pressurized* chamber to a downstream operation based on the pressure differential between the chamber and the downstream operation. For this same reason, the current rejection to claims 34-36, 38, 39, 42, 43, and 45 should be withdrawn, since each of these claims (through claim 34) also requires that the system be designed for pressurization of the loading unit and subsequent "injection" of the particles into the FCC unit in response to that pressurization.

The rejection of this paragraph should be withdrawn for an additional reason. All the claims rejected under this paragraph, including claims 32, 34, and 44, are patentable over this combination of references since there is no reason, even under *KSR*, to make this combination of references in the first instance. The *KSR* decision does not permit the picking and choosing of elements from different references intended to reconstruct the now-claimed invention without *some* reason for doing so; if it had, there would be no invention that was *not* obvious. Here, there is no reason for choosing aspects of Brandauer for combination or modification of Markham.

The system of Markham is not designed for, and has no need for, the particle handling system of Brandauer, since the latter is directed to drawing particles into an entirely non-

valved hopper in a manner that mixes particles from two or more sources into a single load. It is a *batch* operation. Markham, on the other hand, is designed to draw into hopper 3 only a single kind of particle in a relatively *continuous* manner, since Markham is directed to a continuous process for *making* catalysts. That process, of necessity, starts with particles of uniform composition (unlike the mixture of Brandauer) and subjects those particles to specific processing conditions in the column that are unique to the particle type introduced. (See, Markham at col. 2, line 68, through col. 3, line 23.). Markham thus has no need for a hopper that creates a mix of different particle types: Since Markham is set up for only a single process, its system could not accommodate a mix of different particles, since each different particle type would require its own unique set of processing conditions.

Brandauer is similarly irrelevant to applicant's claims at issue, each of which is directed to a system in which storage bins that hold particles to be introduced into the system are coupled to the loading unit by means that *isolate* the bins on a *selective* basis. See, in particular, claim 32 and claims dependent on it, which recite valves that isolate the various storage bins from the intake unit on a selective basis. That is because the system of the present claims is designed to inject discrete loads of one kind of catalyst/additive at a time, not a mixture of different materials such as contemplated by Brandauer, which has no means of determining how much of any one kind of material particle is drawn into the hopper. Because the teachings and purpose of Brandauer are so different not only from the present invention but also from the concept of the Markham reference with which it is sought to be combined, the rejection based on this combination should be withdrawn.

Office Action paragraph 10. Claim 37 (dependent on claim 32 through claims 36 and 34) is rejected as obvious from Markham in view of Brandauer (as applied in paragraph 90, further taken with Yamashita. This rejection is also traversed for the same reasons as provided above.

Claim 37 specifically recites that the transfer pot is pressurized and that the material in the pot is thereafter injected into the FCC unit in response to the pressure differential between the pot and the downstream unit. Claims having these same injection characteristics have been explained to be patentable over Markham itself (paragraph 4), Yamshita itself (paragraph 3), and the combination of Markham and Brandauer (paragraph 9 immediately above.) None of these references individually teaches or suggests any aspect of the particular

injection feature of claim 37. Even if the references were properly combinable, the combination still would not provide the invention of claim 37. And as stated in the response to paragraph 9 above, combination with Brandauer would not be made in the first place, leaving the particular valving of claim 37 as an additional distinguishing feature of the invention of this claim. For these reasons the rejection is improper and should be withdrawn.

Office Action paragraph 11. Claim 40 (dependent on claim 32 through claim 34) is rejected as obvious from Markham in view of Brandauer (as applied in paragraph 9 and 10), further taken with Harpham. Claim 40 recites a moisture trap for the source of pressurized air, which is said to be disclosed by Harpham. This rejection is also traversed for the same reasons as provided above. The underlying Markham and Brandauer references have been distinguished on the basis that they do not teach or suggest the particular injection system that underlies claim 40, and the addition of Harpham does not supplement their teachings in any relevant way. Since the claims from which claim 40 depends are patentably distinct over the basic references, and the tertiary Harpham reference does not add to the teachings of those references in a meaningful way, claim 40 is patentable.

Office Action paragraph 12. Claim 41 (dependent on claim 32) is rejected as obvious from Markham in view of Brandauer (as applied in paragraph 9 and 10), further taken with Evans. Claim 41 recites a controller coupled to the isolation valves, which is said to be disclosed by Evans. This rejection is traversed for reasons recited in the response to paragraph 9, which had also rejected base claim 32. In that response above, applicant argued that there is no reason in the first instance for modification of the Markham system with aspects chosen from Brandauer, which was said by the examiner to teach a system in which particulates are drawn into the particle handling system from different reservoir bins. The Brandauer system is incompatible with that of Markham, and that problem is not solved by anything taught by Evans.

More specifically, the Markham and Brandauer systems are not compatible in the first place since Brandauer is directed to drawing particles from two or more sources into a hopper so as to mix the particles into a single load. The hopper itself is not valved, and the entire load is simply removed from the hopper by gravity when a closure flap is opened. Markham, on the other hand, is designed to draw into hopper 3 only a single kind of particle in a relatively *continuous* manner, since Markham is directed to a relatively continuous process

for *making* catalysts. The Markham process, of necessity, must start with particles that are identical in composition (unlike the physical mixture of Brandauer, which combines particles of two or more different types); Markham subjects those particles to particular processing conditions in the column that are unique to the particle type introduced. (See, Markham at col. 2, line 68, through col. 3, line 23.). Markham has no need for a hopper that creates a mix of different particle types, each of which type would require different processing conditions, since Markham is set up for only a single process. The disclosure of controllable valves by the tertiary Evans reference is not relevant to this basic incompatibility between the primary and secondary references.

Brandauer is likewise irrelevant to the system of claim 41 at issue here, which is directed to a system in which storage bins that hold particles to be introduced into the system are coupled to the loading unit by valves that isolate the various storage bins from the intake unit on a selective basis. That is because the system of claim 41 is designed to inject discrete loads of one kind of catalyst/additive at a time, not a mixture of particles such as contemplated by Brandauer. Nor would the valves as disclosed by Evans make the system of Brandauer any more relevant. Indeed, there is no reason at all to use valves, for example, at the outlet of the Brandauer hopper, and the Brandauer system is not even set up for use with valves at that point.

Finally, the Evans system is fundamentally different from that of Markham as well, since particles from the storage bin 22 of Evans flow to its loading vessel 16 by being metered through valve 24 into a stream of pressurized air 30 that entrains the particles and carries them into vessel 16. That is a wholly different system from that of Markham, in which particles are first sucked into an intermediate storage hopper 3 from a reservoir bin, after which they drop by gravity from hopper 3 into loading vessel 8. The controllable valves of the entirely different Evans system have no place in the combined system of Markham and Brandauer, even assuming that such a combination would have been proper in the first instance. Because of these basic differences among the references and the incompatibility of their systems, this rejection should be withdrawn.

Office Action paragraph 13. Independent claims 1 and 18, and various claims dependent on them, and independent claim 46 have all been rejected as obvious from Evans in view of Yamashita. The Examiner asserts that Evans discloses all elements of the basic

claims except the means for conveying the catalyst or additive particles to the loading unit, but that Yamashita teaches a vacuum system for suctioning particles from storage bins into a hopper positioned above a loading unit. The Examiner asserts that it would have been obvious to substitute Yamashita's conveyance system for the Evans apparatus. This rejection is traversed.

The system of each of the independent claims incorporates a vacuum to draw particles into a hopper associated with the loading unit, from which the particles are transferred to the injection section of the loading unit. Evans has no such vacuum collection aspect, and although a vacuum collection system is shown in Yamashita, the two systems are not compatible and therefore the combination asserted by the Examiner is not properly made.

Here, there would have been no reason to replace the storage bin 22 of Evans, and its means of transferring material to its loading vessel 16, with the vacuum/dust-collector system of Yamashita, and its associated means of transferring suctioned material to its associated loading vessel 2. The combination the examiner asserts would require a whole-scale rebuilding of the Evans system to accommodate the vacuum system of Yamashita, something the ordinary artisan would not have done.

The Yamashita system suctions material into hopper 1, which sits directly above vessel 2. When a certain level of material is suctioned into hopper 1, as determined by a level gauge 9, the valve beneath the hopper opens and the pre-determined amount of material drops by gravity into vessel 2, to which pressurized air is directed by a separate line through valve 12. In contrast, particles from the storage bin 22 of Evans flow to its loading vessel 16 by being metered through valve 24 into a stream of pressurized air 30/32 that entrains the particles and carries them into vessel 16. That system is critical to Evans since air stream 30/32 is also used to pressurize vessel 16 of Evans. (Col. 7, lines 12-24). The Evans system could not accommodate the vacuum-filled hopper of Yamashita since it would have to be completely re-configured to permit a vacuum-collection bin to be placed atop the loading vessel 16 and to provide for the vacuum-collected material to flow by simple gravity into the loading vessel 16; it would also eliminate a source of pressurization for vessel 16, which in the present Evans set-up relies on line30/32 to both load the vessel by entrainment of the particles and to pressurize it.

One skilled in the art would have no reason to completely re-structure the Evans system to accommodate the modification suggested by the Examiner; there is simply no need in Evans for such a change, and it would eliminate other benefits already inherent in the Evans system. Such a change would not have been made. For these reasons, independent claims 1, 18, and 46, and those claims dependent on them are patentable over the cited combination of references. The rejection of paragraph 13 should be withdrawn.

Office Action paragraph 14. Claims 10 and 25 have been rejected as obvious from Evans in view of Yamashita, as applied in the rejection of paragraph 13, further in view of Pendelton. Claim 10 is ultimately dependent on claim 1 and claim 25 is ultimately dependent on claim 18. This rejection should be withdrawn for the reasons provided in response to the previous rejections in paragraph 13. Since the base independent claims, as addressed above, are patentable over the combination of the primary and secondary Evans and Yamashita references, dependent claims 10 and 25 are likewise patentable. Pendelton does nothing to cure the basic incompatibility of the underlying references, and the rejection should be withdrawn for the same reasons as provided above.

Office Action paragraph 15. Claim 28 is rejected as obvious from Evans in view of Yamashita, as applied in the rejection of paragraph 13, further in view of Harpham. Claim 28 is dependent from independent claim 18. This rejection should be withdrawn for the reasons provided in response to the previous rejections in paragraph 13. Since the base independent claim, as addressed above, is patentable over the combination of the primary and secondary Evans and Yamashita references, dependent claim 28 is similarly patentable. The Harpham reference does not cure the basic incompatibility of the underlying references, and the rejection should be withdrawn for the same reasons as provided above.

Double-Patenting Rejection

Applicant acknowledges the provisional obviousness–type double-patenting rejection of this application over co-pending Application 10/593,499. An appropriate terminal disclaimer will be filed in a supplemental response.

Applicant believes the above provides a complete response to the Office Action of October 23, 2007, and that the claims are allowable and in condition to be allowed.

Date: 3/21/08

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